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means, the longer the Glas be, the bigger aperture will it bear, if the Glasses be of an equal goodnes in their kind. Therefore a six will indure a much larger Aperture then a three foot Glas; and a sixty foot Glas will proportionably bear a greater Aperture then a thirty, and will as much excel it also as a six foot does a three foot, as I have experimentally observ'd in one of that length made by Mr. Richard Reives here at London, which will bear an Aperture above three inches over, and yet make the Object proportionably big and distinct; whereas there are very few thirty foot Glasses that will indure an Aperture of more then two inches over. So that for Telescopes, supposing we had a very ready way of making their Object Glasses of exactly spherical Surfaces, we might, by increasing the length of the Glas, magnifie the Object to any assignable bigness. And for performing both these, I cannot imagine any way more easie, and more exact, then by this following Engine, by means of which, any Glasses, of what length soever, may be speedily made. It seems the most easie, because with one and the same Tool may be with care ground an Object Glas, of any length or breadth requisite, and that with very little or no trouble in fitting the Engine, and without much skill in the Grinder. It seems to be the most exact, for to the very last stroke the Glas does regulate and rectifie the Tool to its exact Figure; and the longer or more the Tool and Glas are wrought together, the more exact will both of them be of the desir'd Figure. Further, the motions of the Glas and Tool do so cross each other, that there is not one point of eithers Surface, but has thousands of cross motions thwarting it, so that there can be no kind of Rings or Gutters made either in the Tool or Glas.

The contrivance of the Engine is, only to make the ends of two large Mandrils so to move, that the Centers of them may be at any convenient distance asunder, and that the Axis of the Mandrils lying both in the same plain produc'd, may meet each other in any assignable Angle; both which requisites may be very well perform'd by the Engine describ'd in the third Figure of the first Scheme: where A B signifies the Beam of a Lath fixt perpendicularly or Horizontallly, C D the two Poppet heads, fixt at about two foot distance, E F an Iron Mandril, whose tapering neck F runs in an adapted tapering brass Collar; the other end E runs on the point of a Screw G; in a convenient place of this is fastned H a pully Wheel, and into the end of it, that comes through the Poppet head C, is screwed a Ring of a hollow Cylinder K, or some other conveniently shap'd Tool, of what wideness shall be

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be thought most proper for the size of Glasses, as employ'd: As, for Object glasses, between twelve foot long, the Ring may be about six inches over more for those longer Glasses. It would be very chargeable, to have four or five several Tools between an inch and a foot, one for all Glasses between an inch and a foot, another for all between ten and an hundred, a hundred and a thousand foot long; and if Curious far, one for all lengths between a thousand and ten thousand, indeed the principle is such, that supposing the Mandril of good length, and supposing great care be used in them, I see no reason, but that a Glas of a thousand, or more foot long, may be as well made as one of ten; for the real Mandrils and Tools be made sufficiently strong to bend; and supposing the Glas, out of which they are made, of so great a regularity in its parts as to refraction: is to contain the Sand, and by being drove round very means of a small Wheel, which may be mov'd with one of the Glas: The other Mandril is shap'd like this, but instead of a taper one, and runs in a Collar, that by the joynt made like M in the Figure, it can be still adjusting the waisting neck: into the end of this Mandril is screwed with Cement or Glue is fastned the piece of Glas of the middle of which Glas is to be plac'd just on the Lath O P is to be set and fixt (by means of cement the manner whereof will be sufficiently evidenc'd in the next Chapter) at an Angle as is requisite to the forming of such a Spherical Surface; the geometrical ground of which being though not heeded before, I shall, for brevities sake, the Mandril is to be made (by means of the former, or by running round very swift also, by which two cross motions chuse (if care be us'd) but be wrought into a spherical Surface.

But because we are certain, from the Laws of Opticks, I have experimentally found to be so, by an Instrument describ'd (that the lines of the angles of Incidence be made of those kind of Figures, or some other, such as Des Cartes has invented, and demonstrated in his Mathematical Works, we might hope for a much greater perfection then can be rationally expected from spherical ones; for in all others, we find, that the larger the Telescope Object is, the shorter those of the Microscope, the better they magnify.